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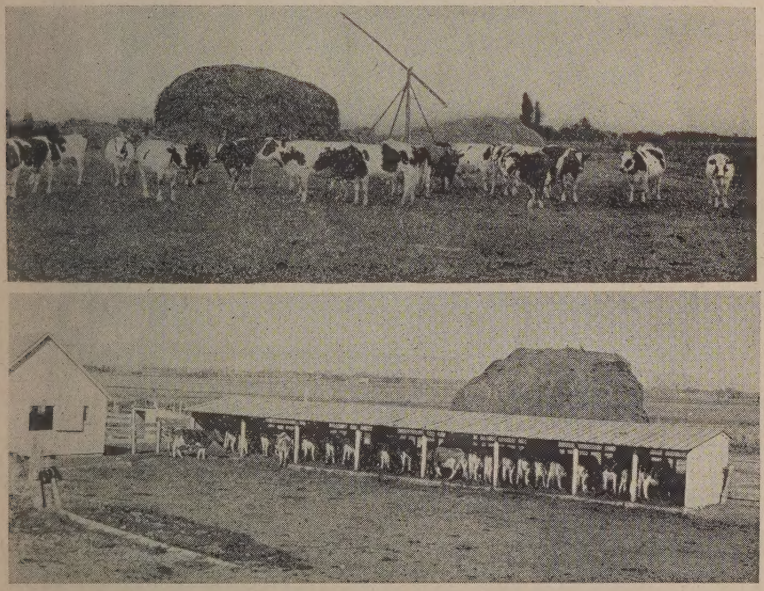
Suggestions for Profitable Dairying

By

D. L. FOURT and G. C. ANDERSON



Idaho alfalfa hay and dairy cows are good business partners.

COOPERATIVE EXTENSION SERVICE IN AGRICULTURE AND HOME ECONOMICS OF THE STATE OF IDAHO UNIVERSITY OF IDAHO COLLEGE OF AGRICULTURE AND UNITED STATES DEPARTMENT OF AGRICULTURE COOPERATING

DAIRY SECTION

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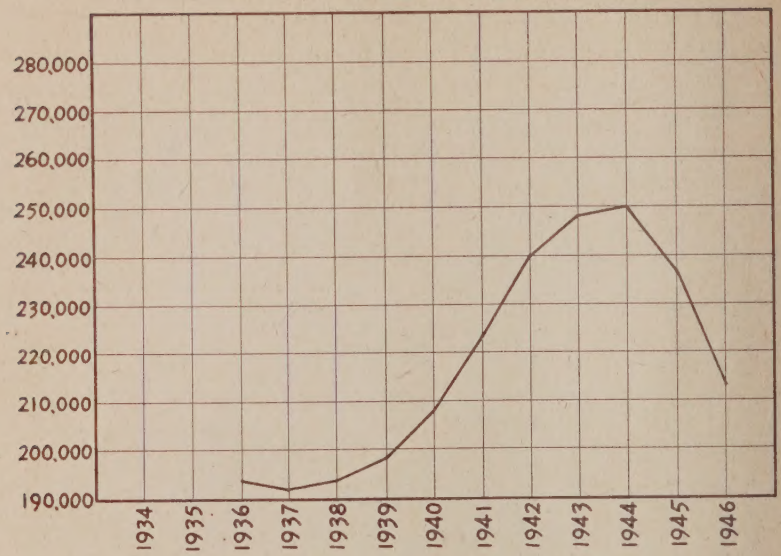
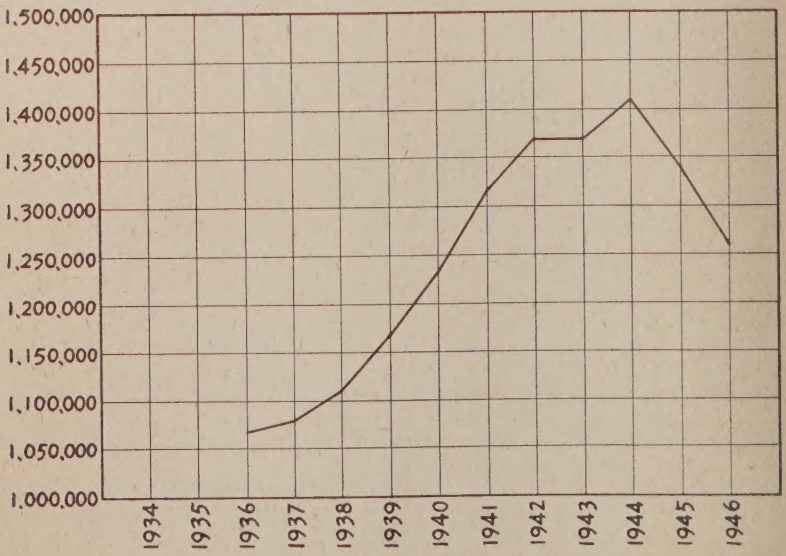
NUMBER OF DAIRY COWS IN IDAHO
BY YEARS 1936 TO 1946



POUNDS OF MILK PRODUCED IN IDAHO
BY YEARS 1936 TO 1946



Suggestions for Profitable Dairying

D. L. FOURT and G. C. ANDERSON*

Idaho's Dairy Industry

THE dairy industry has developed into one of Idaho's most important industries. Almost 82 percent of all farms in Idaho keep milk cows. According to the Division of Agricultural Statistics, United States Department of Agriculture, cash income from milk ranked first among all agricultural commodities in the State in 5 of the last 10 years (1936 to 1946). Milk ranked first in 1937, 1938, 1940, 1941, and 1942. No other livestock enterprise approached the returns from milk in either farm value, gross income or cash income.

Idaho exports large quantities of dairy products and is in competition with other states for the sale of her surpluses. California is the primary market for Idaho dairy products. The population of California and other West Coast states has increased rapidly in recent years and will require greater amounts of dairy products in the future.

The future expansion of the dairy industry in this state will depend upon whether Idaho can successfully compete with other states in economy of production and quality of products. Idaho has more favorable feed and climatic conditions than many other states with larger dairy industries. If Idaho dairy farmers will use efficient methods in production, they will be able to compete successfully with other areas in cost of production. However, economical production is not all that is necessary. High quality products must be produced if Idaho dairymen, in competition with other sections, are to find a ready market. High quality dairy products sell at higher prices and more readily.

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Dairy Cows Supply Good Markets for Idaho's Feed

DAIRYING affords a most effective method of marketing feed grown on Idaho farms. High-producing dairy cows condense bulky feed crops into smaller packages, thereby reducing freight costs to distant markets. Alfalfa, pasture, corn silage, home-grown grains and by-products including beet molasses, wet beet pulp, cull potatoes, pea and bean straw, and cannery waste furnish excellent ingredients for dairy cattle rations.

Low-Cost Rations from Home-Grown Feeds

ECONOMICAL production requires judicious selection of home-grown feeds in the proper mixtures and feeding in correct ratio to production. When green, leafy alfalfa hay is fed in unlimited quantities, without succulence, almost any mixture of home-grown grains is satisfactory, because of the large amount of protein in the hay. The entire feeding problem is changed if high-quality alfalfa hay is not included or is limited in the ration. If non-legume hay, wet beet pulp, cull potatoes, silage, etc. are added to a ration, part or all of the high quality alfalfa is replaced, resulting in less protein intake. Such changes must be offset by correcting the grain ration accordingly.

Many dairymen follow a "thumb" rule as a general guide in feeding grain. Holsteins are fed 1 pound of grain mixture for each 5 or 6 pounds of milk produced daily and Jerseys and Guernseys are fed 1 pound of grain mixture for each 3 or 4 pounds of milk produced daily. Breeds with intermediate test are fed accordingly.

This "thumb" rule is approximately correct for cows of average production, but it should be applied with judgment, using cows as a guide. Low-producing cows are sometimes overfed and tend to become fat while high-producing cows are sometimes underfed and tend to become thin.

The following is a more accurate guide in feeding grain. Higher testing cows require slightly more grain and lower testing cows require slightly less grain than the rate suggested.

Guide as to Rate of Feeding Grain

Percent of fat in milk	Daily production	Amount of grain to feed daily
3.5	Less than 20 lb. milk (about ¾ lb. fat) or Less than 2½ gal. milk	No grain
3.5	More than 20 lb. milk (about ¾ lb. fat) or More than 2½ gal. milk	0.4 lb. grain for each lb. of milk above 20—or 3.3 lb. grain for each gal. milk above 2.5
5.0	Less than 15 lb. milk (about ¾ lb. fat) or Less than 2 gal. milk	No grain
5.0	More than 15 lb. milk (about ¾ lb. fat) or More than 2 gal. milk	0.5 lb. grain for each lb. of milk above 15—or 4 lb. grain for each gal. milk above 2

Suggested Grain Mixtures

To Be Fed With a High Protein Roughage

When the roughage consists of green, leafy alfalfa alone, use either of the following grain mixtures:

Mixture No. 1

Barley or corn	300 lb.
Wheat bran	100 lb.
Digestible protein	10.2 percent
Crude protein (total)	12.8 percent

Mixture No. 2

Barley	200 lb.
or	
Barley	100 lb.
Wheat	100 lb.
Oats	100 lb.
Wheat bran	100 lb.
Digestible protein	10.3 percent
Crude protein (total)	12.8 percent

Mixture No. 3

Wheat bran	100 lb.
Wheat	100 lb.
Oats	100 lb.
Barley	100 lb.
Digestible protein	10.8 percent
Crude protein (total)	13.2 percent

Mixture No. 4

Corn and Cob meal	100 lb.
Oats	100 lb.
Wheat bran	100 lb.
Digestible protein	10.3 percent
Crude protein (total)	12.8 percent

Suggested Grain Mixtures
To Be Fed With a Medium Protein Roughage

When the roughage consists of alfalfa, hay and succulent feeds, such as silage, wet beet pulp, beet tops, potatoes, or root crops, also with grain hay, pea or bean straw, or poor quality alfalfa, use either of the following grain mixtures:

Mixture No. 1

Wheat or barley	100 lb.
Oats	100 lb.
Pea meal or bean meal	50 lb.
or	
Linseed oil meal	25 lb.
Digestible protein	12.5 percent
Crude protein (total)	15.0 percent

Mixture No. 2

Wheat or barley	100 lb.
Oats	100 lb.
Pea meal	100 lb.
Wheat bran	100 lb.
Digestible protein	13.2 percent
Crude protein (total)	15.9 percent

Mixture No. 3

Barley or wheat	100 lb.
Oats	100 lb.
Wheat bran	100 lb.
Cottonseed meal	35 lb.
Digestible protein	13.1 percent
Crude protein (total)	16.0 percent

Mixture No. 4

Wheat	100 lb.
Barley	100 lb.
Oats	100 lb.
Wheat bran	100 lb.
Pea meal or bean meal	100 lb.
Digestible protein	12.8 percent
Crude protein (total)	15.4 percent

Suggested Grain Mixtures
To Be Fed With a Low Protein Roughage

When the roughage contains no alfalfa, but is all low in protein such as grain hay, timothy, alfalfa chaff and succulence, use either of the following mixtures:

Mixture No. 1

Wheat	100 lb.
Oats	100 lb.
Wheat bran	100 lb.
Cottonseed meal	50 lb.
Digestible protein	14.7 percent
Crude protein (total)	17.6 percent

Mixture No. 2

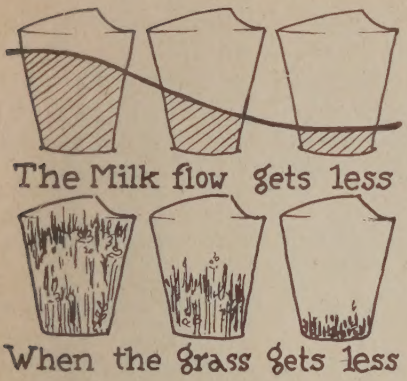
Wheat	100 lb.
Wheat bran	200 lb.
Pea or bean meal	100 lb.
Digestible protein	14.6 percent
Crude protein (total)	17.4 percent

Mixture No. 3

Barley	100 lb.
Oats	100 lb.
Wheat bran	100 lb.
Cottonseed meal	75 lb.
Digestible protein	15.4 percent
Crude protein (total)	18.6 percent

Note: When good quality hay is available, the importance of an exact grain mixture is greatly reduced, and if one grain is not available or is too high in price, another grain of similar feeding value may be substituted. Barley and wheat may be used interchangeably and not materially change the ration as long as the amount of wheat does not exceed 25 percent of the grain mixture. Cottonseed meal, linseed oilmeal (old process), and soybean oilmeal may be used interchangeably and not materially change the ration. Dried beet pulp should not exceed 25 percent of the mixture.

Summer Suggestions



More milk per acre is produced from good pasture than from any other feed.

Pasture grasses grow less in late summer—supplemental feeds are necessary.

Feed alfalfa hay once daily.

Heavy producing cows should have grain.

Feed minerals while cows are on pasture.

Supplemental Feeds

Tonics and Patent Medicines

Healthy cows do not need tonics.
Sick cows need specific medicines.
Tonic feeds cost too much and have little value.
Call a licensed veterinarian for sick cows.

Commercial Feeds

Ready-mixed feeds no better except they have greater variety.
Some mixed feeds good, some very poor.
Value of commercial feeds depends upon:

1. Digestible nutrient content
2. Cost per pound of nutrients
3. Kind and quality of ingredients
4. Adaptability of feed to community
5. Performance record

Proprietory mixed feeds are not recommended except for high producing cows.

By-Products

Dairy cows convert low value by-products into valuable products.

Convert:

Cull potatoes
Wet beet pulp
Beet molasses
Cannery wastes
Alfalfa and clover seed screenings
Apple pomace
Bean and pea by-products—into dairy products.

Give the Calf a Chance

The Danger Age

Give the calf a good start on whole milk during the first 2 weeks. During the first 3 or 4 days, feed milk from dam. Give 5 to 8 pounds whole milk daily, depending on size and condition of calf, for the first two weeks. This is 5 to 6 pounds daily for smaller breeds and 7 to 8 pounds daily for larger breeds.

Six Month of Age Raised on Skim Milk, Grain, and Hay

Feed legume hay as a source of vitamin A as soon as the calf will eat it.

Follow either of three plans of feeding after 2 weeks on whole milk.

Well-grown Yearling

Plan I. Limited whole milk available. Third week: Continue whole milk feeding for 6 or 7 weeks, but at 2 weeks start feeding dry calf meal. As the consumption of dry calf meal and green leafy hay is increased, the whole milk is reduced gradually so that no milk is being fed after the seventh week. The calf should receive all the calf meal it will consume up to 3 or 4 pounds daily. After 4 months a simpler mixture can be substituted consisting of equal parts rolled or ground barley, rolled or ground oats, wheat bran and linseed oilmeal.

Dry Calf Meals

Calf Meal No. 1

25 lb. rolled or ground barley
25 lb. rolled or ground oats
15 lb. wheat bran
35 lb. dried buttermilk or dried skim-milk
2 lb. odorless steamed bonemeal
1 lb. stabilized iodized salt

Calf Meal No. 2

25 lb. dried buttermilk or dried skim-milk
25 lb. rolled or ground barley
25 lb. rolled or ground oats
17 lb. wheat bran
5 lb. linseed oilmeal
2 lb. odorless steamed bonemeal
1 lb. stabilized iodized salt

Calf Meal No. 3

25 lb. rolled or ground barley
35 lb. rolled or ground oats
12 lb. wheat bran
12 lb. linseed oilmeal
13 lb. dried buttermilk, dried skim-milk, dried blood, fish meal, or dried rendered tankage
1 lb. steamed bonemeal
1 lb. finely ground limestone
1 lb. iodized salt

Plan II. Skimmilk available. Third week—gradually substitute skimmilk for whole milk. Give all the hay and grain the calf will consume. The following is a suggested home-grown grain mixture to be fed with skimmilk and alfalfa hay.

3 parts (by weight) yellow cracked corn or rolled or ground barley
3 parts rolled or ground oats
1 part wheat bran.

Fourth week to 6 months: 8 to 12 pounds of skimmilk daily according to the calf's age and the supply of skimmilk. Feed home-grown grain mixture up to 2 pounds daily, legume hay or good pasture (after 4 months), pure water and salt.

Plan III. Dried Milk solution and calf meal. Third week, change to milk solution: Using dried buttermilk or dried skimmilk 1 part to 9 parts warm water. Feed as skimmilk (Plan II) and either of the dry calf meals suggested under Plan I. During the seventh week, gradually reduce amount reconstituted skimmilk and feed all calf meal and hay calf will consume. After the seventh week no dried milk solution need be fed.

Do

1. Feed whole milk the first 2 weeks.
2. Keep young calves in separate pens.
3. Wash and sterilize buckets.
4. Weigh or measure milk to each calf.
5. Feed calves individually in stancheons.
6. Keep milk at uniform temperature.
7. Keep pens clean, well ventilated and well lighted.
8. Treat sickness promptly.

Don't

1. Use dirty buckets.
2. Overfeed.
3. Underfeed.
4. Feed as a group.
5. Feed sour milk.
6. Feed cold milk.
7. Neglect sickness.

Mastitis

MASTITIS (garget) is probably the most serious disease confronting the dairy industry. The losses are indicated by reduced milk production, weak and blind quarters, shortened lactation periods and short lifetime production. Surveys show considerable variation in percentage of infection, ranging from 70 to 80 percent of the herds containing reacting animals and from 30 to 40 percent of the cows being positive reactors. Many cows are

infected and carry the organism for years with only an occasional flare-up, while others have repeated acute attacks. Production of infected cows may be reduced from a small amount in non-clinical cases to 100 percent in severe cases. Some authorities estimate that on th average production of infected cows is reduced 20 percent. Often the highest producer sustains the greatest loss.

Mastitis can be controlled by a combination of good herd management and treatment by a veterinarian, the treatment being of little value unless good management practices are used. This is demonstrated in the University of Idaho herd which previously had 66 percent of the cows infected, but has had a negative herd for more than 2 years.

Most cases of mastitis are caused by a germ called streptococcus agalactiae. This type of mastitis is contagious. Other types of organisms cause a small percentage of mastitis cases, except in special herd cases where some specific management practice is faulty.

Several contributing factors lower the resistance of the animal and make it more susceptible to the infection. Among these are: (1) bruising of the udder, (2) injury to the teat or quarter, (3) chilling, (4) rough milking, (5) specific diseases (cow pox), (6) incomplete milking, and (7) bucket-fed calves nursing each other. A hard, swelled, congested quarter is a sign of beginning or reoccurring infection. New cases often get started a short time after common bruising. The injury to the udder reduces the natural resistance and permits the rapid development of the organism which may have been inactive in the udder for some time.

The disease usually spreads from an infected animal to susceptible cows in the milking herd. The germ usually enters the healthy udder through the teat canal. It may be transmitted by teat cups, the milker's hands, or contaminated bedding.

Practices which reduce the spread of mastitis include the prevention of predisposing factors and reducing the opportunity for the germ to enter the teat canal of the healthy udder.

1. Determine the reactor and non-reactor cows by laboratory tests. Carrier cows (mild chronic cases) should be identified by having laboratory tests conducted on milk from individual quarters. (Most veterinarians are equipped to make these tests.) All infected cows, including carrier cows which have not had an acute attack but have a positive test should be milked last.

2. Herd replacements should be limited to unfreshened heifers as milking cows are more apt to be infected. Milking cows should be tested before being added to the herd, and if positive should be milked last.

3. Every effort should be made to prevent bruises and other injuries to the udder. Apply heat and massage immediately to all hard, swelled and congested udders. Frequent milking and massage helps to reduce the swelling.

4. If possible, segregate reactor cows from non-reactor cows.

Eliminate reactor cows from the herd as soon as heifer replacements are available.

5. Milk negative heifers first, negative cows next, reactor cows that appear normal next and cows known to have garget last.

6. Never milk infected cows on the floor. Dispose of the mastitis milk in such a way that other cows will not come in contact with it.

7. If machine milking, rinse the teat cups in lukewarm water, then sterilize by leaving immersed in a chlorine solution (200 parts per million) for 2 minutes (approximately 2 minutes is necessary to kill the organism). An extra milking machine head and teat cups are necessary to save time. If hand milking, rinse hands between cows.

8. Dip the ends of teats in chlorine solution after milking when the weather permits.

9. Cows developing inflamed udders should be placed in a box stall. Apply hot packs and massage and milk frequently and reduce the amount of grain. If the congestion in the udder can be reduced quickly, the mastitis germs have less chance of getting a start in the tissues.

10. Practice rapid milking.

The treatment of mastitis should be administered by a veterinarian. The type of germ causing the disease should be determined so that the proper treatment can be selected. Many drugs have been used, some with limited success. Three preparations that have shown merit, if used in the right cases and at the right time, are homogenized sulfanilimide, tyrothricin and penicillin. These are introduced directly into the udder with aseptic technique. Homogenized sulfanilimide is recommended as treatment of milking cows and tyrothricin as treatment of dry cows.

Rapid Milking

RAPID milking is a system which results in quicker and more complete milking with less possibility of injury to the udder (see Idaho Extension Circular No. 84).

Advantages of rapid milking are: (1) reduces irritation to the udder, (2) increases production by reducing udder trouble and by maintaining high milk flow longer in the lactation period through more complete milking, (3) reduces the labor required for milking by shortening the time necessary for milking each cow, and (4) makes possible the production of cleaner milk.

Steps in the Rapid Milking System

1. Stimulate cow to let down milk by washing and massaging the udder and teats with warm water (120° to 130°) containing 100 parts per million of available chlorine.

2. Use strip cup. Milk one or two streams of milk from each teat into a strip cup. This procedure detects flakes or clots (indicating mastitis), lowers bacteria count, and aids in stimulating "let down" of milk.

3. Apply teat cups 1 minute after washing udders. The "let down" of milk should be complete in 1 minute after washing and massaging.

4. Strip by machine. Hand stripping can be greatly reduced by machine stripping. Remove teat cups as soon as milk ceases to flow. Do not allow machine to operate on a dry udder as it may cause irritation of the udder. There is no danger of injury if the machine operates only when there is milk in the udder.

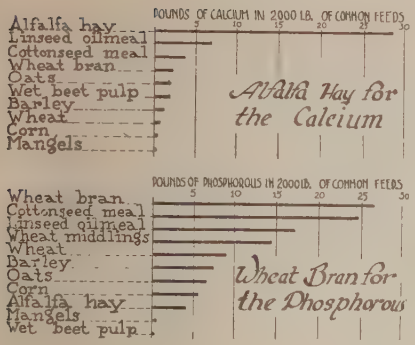
5. Check for completeness of milking. Examine each quarter to determine if stripping is necessary. If milk remains in a quarter, remove it with full hand squeezes.

Most cows respond readily to rapid milking but some "problem cows" may not, and should be milked last. Cows showing signs of mastitis should be milked last. First calf heifers and fresh cows can be trained most rapidly to rapid milking. Warm water is essential for the success of this procedure.

Milking Before Freshening

Milking before freshening (prepartum milking) is sometimes practiced to prevent udder congestion, but presents a calf feeding problem as the calf requires the colostrum which is high in vitamin A and disease-resistant properties. The recommended procedure where prepartum milking is practiced, is to preserve the prepartum milk by freezing in sterilized containers. Sufficient of the prepartum milk for one feed is frozen in each container. The frozen milk is melted and warmed to a temperature of from 90° to 100° F. before feeding. As a safeguard, it is advisable to feed the young calf vitamin A, in some type of fish oil or vitamin A tablets.

Minerals



Minerals Have a Definite Function in Nutrition

They are not a cure-all for all troubles.

They are not a substitute for other feeds.

What and When Minerals Are Needed

Salt, iodine, and phosphorous are minerals likely to be deficient in Idaho.

Cows should have free access to fine stabilized, iodized, dairy salt.

Many areas in Idaho are deficient in iodine. A deficiency of iodine may result in breeding trouble. Iodine prevents goiter in calves.

Block salt is not recommended because it is difficult for high-producing cows to easily obtain the required quantity.

Alfalfa hay furnishes sufficient calcium.

Wheat bran is a good source of phosphorous.

In southern Idaho phosphorous is often deficient.

In northern Idaho both calcium and phosphorous may be deficient when the supply of alfalfa hay is limited.

A depraved appetite indicates a marked deficiency.

Odorless steamed bonemeal, preferably bone flour, is recommended.

Commercial Mineral Mixtures

Often cost too much.

Often unjustifiable claims are made for them.

Sometimes contain unessential ingredients.

May not be adapted to region.

No better than cheaper home mixture. May be harmful.

Indiscriminate feeding of mineral supplements is not recommended either from the standpoint of good nutrition or economy.

Suggested Mineral Feed

100 pounds sterilized bone flour.

100 pounds stabilized iodized salt.

Mix and feed as 2 percent of grain mixture.

Also keep before animals at all times.

Good Pastures Are the Foundation of Successful Dairying

NO FACTOR is of greater importance than pasture in increasing milk production and reducing feed and labor costs. Pasture is nature's feed and supplies a palatable, succulent, nutritious food that contains essential vitamins, minerals, and other elements.

Carrying capacities of irrigated pastures range from 1 to 3½ cows per acre during the growing season, with an average of 2 cows per acre on the better managed pastures. However, these cows usually receive about one-fourth of their total nutrients from supplementary feeds such as hay and grain so the pasture supplies feed for about 1½ cows per acre. Pasture should be supplemented by feeding hay. High producing cows should receive grain in addition.

Land producing good pasture, utilized by dairy cows, will return as much income per acre as from most other crops at less overhead and harvesting costs. Based on experimental results, good irrigated pastures supply sufficient food nutrients during the pasture season to produce over 200 pounds of butterfat per acre. Too often rough, untillable land is used as the only source of pasture, resulting in a shortage of feed during the summer months. Feed production on rough land can be greatly increased by good management, including leveling to facilitate proper watering, and fertilizing regularly with barnyard manure or commercial fertilizer.

Pasture Is Nature's Cow Tonic

1. It helps prevent breeding trouble.
2. It helps prevent mineral deficiency.
3. It increases assimilation of mineral feeds.
4. It furnishes essential vitamins.
5. It helps correct winter feeding mistakes.
6. It stimulates milk flow.
7. It is ideal feed before the cow freshens.

Pasture Management

Proper pasture management is essential for satisfactory returns. A successful pasture should become well established the first year. Good pasture management in southern Idaho includes:

1. Frequent irrigation prevents drying of the surface soil. Too many pastures suffer from lack of water. Proper irrigation will increase carrying capacity and milk yield as much as 20 percent in comparison to improper irrigation.
2. Remove cattle while the land is being irrigated. Irrigating while stock are on the pasture is injurious to the stand of grass and some plants are tramped out.
3. Delay grazing in the spring until the grass is 4 to 6 inches high. Green, rapidly growing grasses and legumes are most palatable, highest in total digestibility, and are excellent sources of minerals and vitamins.
4. A light covering of manure annually keeps the pasture growing.
5. Harrowing twice during the season scatters the droppings. Unscattered droppings cause rank, unpalatable patches of grass throughout the field which are not eaten and therefore reduce carrying capacity of the pasture. Disking and heavy cultivation with a springtooth harrow reduces the yield of pasture. If weeds grow rank, clipping is desirable.

6. Overgrazing during the first year is a common cause of pasture failure. Overgrazing weakens many grasses, restricts root system and reduces rate of growth. It is usually not desirable to graze pasture the first year until August, and then graze lightly. Discontinue grazing early enough in fall to permit a good growth for winter covering.
7. Rotation of grazing greatly improves the quality of the pasture and increases the carrying capacity. Divide the pastures into two or three fields and graze one field while the other is growing and being irrigated.

The best fertilization of irrigated pastures is top dressing with barnyard manure. Combining proper irrigation and top dressing with manure on old pastures may result in increased pasture yields and milk or 50 percent increase in production. Many areas need the barnyard manure supplemented with phosphate fertilizer. If barnyard manure is not available, a combination of nitrogen and phosphate fertilizer is recommended.

Idaho Pasture Mixtures

Southern Idaho Mixture
Upper Snake River Valley
Irrigated

	Pounds per acre
Smooth brome	6
Orchard grass	4
Tall (alta fescue)	4
White clover	1
Alsike clover	1
	16

Middle and Lower Snake River Valley
Irrigated with an abundance of water.

Smooth brome	6
Orchard grass	4
Tall (Alta) Fescue	4
Ladino or White Clover	2
	16

Middle and Lower Snake River Valley
Limited supply of irrigation water

Smooth brome	6
Orchard grass	4
Crested wheat grass	4
White clover	1
Alfalfa	1
	16

In the above mixtures use 6-8 pounds of tall meadow oat grass in place of the orchard grass in areas where the soil is sandy.

Recommended varieties of grasses:
Smooth brome—Manchar
Mountain brome—Bromar
Tall fescue—Alta
Tall meadow oat—Tualatin

Northern Idaho Mixtures
Uplands and bench lands—long time pastures

	Pounds per acre
Smooth brome	6
Tall meadow oat	5
Tall (alta) fescue	4
Orchard grass	3
Alfalfa	2
	20

Uplands and bench lands—Temporary pastures.

Sweet clover	6
Mountain brome	6
	12

Low bottom lands

Smooth brome	5
Tall (Alta) Fescue	4
Orchard grass	3
Redtop	1
Alsike clover	1
Alfalfa	1
	15

Dike lands—permanent pastures

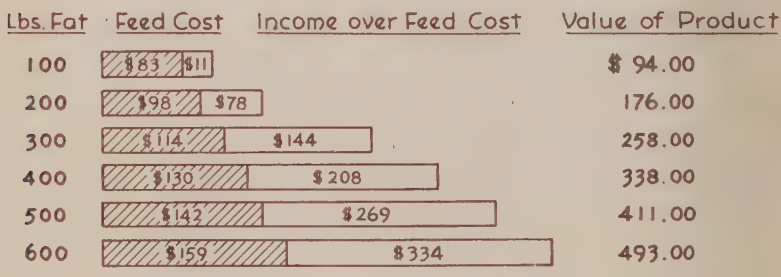
Reed canary grass	6
Alsike clover	2
	8

Reviving Old Pastures

Old pastures may be revived and carrying capacity increased by methods previously suggested. Pasture management should include rotational grazing, scattering manure clumps, and proper irrigation with top dressing with manure, or if needed, phosphorous fertilizer.

High-Producing Cows More Profitable

A COMPILATION of data obtained in dairy herd improvement associations throughout the United States in 1944 shows how sharply income over feed cost rises as the production level increases.



Idaho Cows Produce

	Milk	Butterfat
Average of all Idaho cows in 1945	5690 lb.	225 lb.
Average of all Idaho cows in D.H.I.A. (1945)	8601 lb.	355 lb.
Superiority of D.H.I.A. cows	+2911 lb.	+130 lb.

High producing herds are developed by using good practices in:

1. breeding
2. feeding
3. management
4. culling
5. housing
6. marketing
7. milking methods

Which 10-Cow Herd Would You Want To Own?

Herd	Av. lbs. butterfat per cow	Gross income	Income over feed cost
1.	200	$1760	$ 780
2.	300	2530	1440
3.	400	3380	2080
4.	500	4110	2690

TEST YOUR COWS PROVE YOUR BULLS IMPROVE YOUR HERD

See your County Agent regarding membership in a Dairy Herd Improvement Association.

It Pays to Keep Records

Records Give Light—Why Work in the Dark?

I. Breeding records show:
1. When to dry each cow and prepare her for next freshening.
2. Sire and dam of each animal.
3. Age of each animal.
4. Shy breeding and sterility of each cow and the bull.

II. Production records show:
1. Profit or loss from each cow.
2. Amount to feed and when to change.
3. Value of a sire through production of daughters.
4. Sale value of a cow and her calves.

III. Registration, transfer, and pedigree records:
1. Insure confidence in breeding.
2. Increase sale value of cattle.
3. Assist in selling and advertising.

A Tale of Two Herds

Same Community
Same Year
Same Market

Returns Above Feed Cost

Herd A	Herd B
$480.00	$735.72

Why the Difference?

	Herd A	Herd B
Not the size of herd	16 cows	6 cows
Not the breed	Grade Holsteins	Grade Holsteins
Not feed cost per cow	$52.53	$86.23
It was		
Average production of fat	177.6 lb.	446.6 lb.

Note: Actual Dairy Herd Improvement Association records in the same community, the same year.

Your Future Herd Depends on Your Present Bull

Think This Over

A survey of 295 Idaho dairy farms showed:

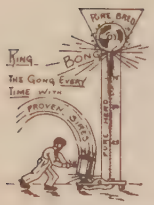
Less than one-half herd bulls registered.
One fourth were just scrubs.
Only 43 per cent of the farmers owned bulls.

Here Are Your Facts

	Cost of Bulls	Income Per Cow	Income Per Herd
Herds with registered bulls	$95.42	$92.70	$954.81
Herds with unregistered bulls	44.68	79.57	819.67
Difference	$50.74	$13.13	$135.14

A saving of $50.74 in cost of bulls lost the dairymen $135.14 yearly on each of their herds of 10.3 cows.

Methods of Selecting a Herd Sire



The successful breeder and dairyman considers everything.

1. Proved sire—Production and type of a bull's daughters are the best guide.
2. Pedigree—A bull's transmitting ability is indicated by the production and type of his half sisters. Make certain of the top half of the pedigree by selecting a son of a proved sire. The lower half of the pedigree should be a succession of as many high record dams sired by proved sires as possible. Several successive generations of proved sires reduce the chances of a failure when selecting a bull by pedigree.
3. Type—Breed type is essential in breeding uniform cattle of highest value. Consider not only the type of a bull, but the type of his ancestors as well.

What This Good Bull Did
What Is He Worth?

The Bull
King Segis Matador Walker,
Owned by the University of
Idaho

These seven daughters of King Segis Matador Walker averaged 23,192 pounds of milk and 782 pounds of fat at 5 years 6 months 3 days of age.

Improvement of His Daughters Over Their Dams

	Lb. Milk	Lb.Fat	Age
12 daughters	13,243	454	2 yrs. 5 mos. 17 days
12 dams	8,526	303	2 yrs. 4 mos. 15 days
Increase (pounds)	4,717	151	
Increase (per cent)	55.3	49.8	

151 lb. fat × 30c = $45.30 yearly per cow. $45.30 × 12 daughters = $543.60 yearly. $543.60 × 5 milking years = $2,718.00 worth of fat from 12 cows in their lifetime due to a good bull.

Would You Buy a Dead Bull?

Many breeders wish they could buy back the bull that went to the butcher. Of 208 Idaho bulls that have been proved, 50.5 per cent were dead before their value was determined. Good bulls are too valuable to be eaten.

You Never Know—Until the Bull Is Proved

Of 208 bulls proved in Idaho

22.1 per cent decreased production an average of 60 lb. fat per cow.

11.6 per cent just about held their own—with 2 lb. decrease.

66.3 per cent increased production an average of 79 lb. fat.

Neighbors should exchange bulls and keep both alive until the daughters freshen.

Cooperative Bull Association Results

	Cost of Bull	No. cows bred	Bull cost per man	Bull cost per cow	No. of years bulls used	Bull cost per cow per year
Before organization	$ 82.00	10.1	$82.00	$8.09	2	$4.05
After organization	213.00	33.4	35.00	6.36	6	1.06

What Idaho Farmers Have Done Through Cooperative Bull Associations

Bought good bulls cooperatively.

Reduced bull costs $47 per man.

Reduced bull costs $3 per cow yearly.

Increased fat production 62 lb. per cow the first cross.

Improved type of cows.

Cooperated in disease control.

Established definite breeding program.

Standardized a breed in the community.

What Idaho Farmers Have Done Through Community Dairy Stud Bull Service

1. Improved the quality of their dairy herds through use of good dairy sires.
2. Secured service from high quality sires at low cost.
3. Eliminated expense and danger involved in keeping a herd sire.
4. Established a definite breeding program.
5. Made high quality Dairy Sire Service available to small herds.
6. Reduced traffic in inferior bulls of questionable breeding.
7. Adopted approved sanitation and disease control practices to improve breeding efficiency.
8. Made available choice of breed to herd owner.
9. Adopted approved feeding and management practices.
10. Stimulated interest in top quality dairy cattle.

Management of Herd Sire

1. Give him exercise—it helps prevent sterility and increases activity.
2. Furnish large pen at least 1800 square feet, or overhead or ground cable; safe-keeper breeding chute.
3. Do not use before one year old—limited service until 2 years. Allow cows only one service.
4. Do not let him run with cows. This overworks bull and is dangerous.
5. Use bell metal ring instead of light ring. Use Jensen halter where ring is torn out of nose.

   A 20-foot chain from horns or halter and through ring assists in catching bull and tends to quiet him.
6. Keep feet trimmed—lengthens usefulness of bull.
7. Feed

   —limited amount of hay; do not allow large barrel to develop.

   —limited amount of grain mixture of oats and wheat—keep in good flesh, but not fat.

   —salt—fresh water.

   —green feed or grass occasionally.

Good Breeding Pays

This Is Daisy

172 lb. fat

Her owner milked her 600 times in a year for $28.33 over feed cost

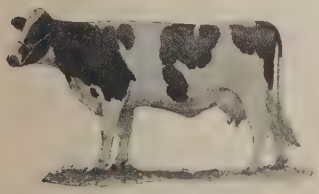
Not so good: But see her daughter

This is Polly

470 lb. fat

Polly's owner milked her 600 times in a year for $128.85 over feed costs

A good cow—but see her daughter by a bull association sire



The Most Expensive Cow in the World
The Scrub Purebred

In one year she produced only 5,538 lb. milk and 170 lb. fat

Her feed cost was $46.55

She made only $28.28 above feed cost

She did not pay expenses

Don't keep a scrub even though she is registered

This is Daisy's Daughter

By a good registered bull—378 lb. of fat

The same dairyman milked her 600 times also, but got $111.25 over feed costs—equal to four cows like her mother

A good bull made the difference

Why use scrubs?

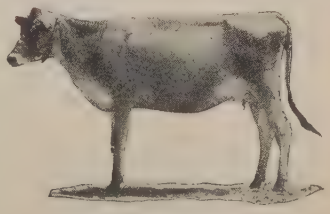
This is Polly's Daughter

691 lb. fat

The same dairyman milked her 600 times and got $212.22 over feed costs

Good proved sires make a herd better

Don't let the profits backslide



A Great Loss to Dairying
A Stunted Cow

This heifer was freshened at 14 months

A boarder now

A low producer always

Breed heifers to freshen at 24 months or over

Artificial Insemination

ARTIFICIAL insemination is the placing of male reproductive cells in the genital tract of the female by mechanical means rather than by natural mating. Widespread interest in this method of breeding has been indicated by dairymen in Idaho.

Advantages of artificial insemination include:

1. The usefulness of a meritorious proved sire may be greatly increased.
2. Valuable sires that cannot make a satisfactory service because of age, size, or injury may in many cases be continued in service.
3. Under carefully controlled conditions the danger of spreading certain genital diseases is materially reduced.
4. Individual dairymen may dispense with their own bulls.
5. Matings may be made between outstanding individuals located great distances apart at less expense or hazard than by transporting one of the animals.

Limitations of artificial insemination include:

1. A skilled, well-trained technician must make the semen collection and insemination.
2. Special instruments and materials are necessary.
3. Proper facilities for cleaning and sterilizing all equipment and instruments must be available to control spread of disease.
4. The scarcity of bulls of proven transmitting ability may lead to the use of inferior sires on a large scale.
5. Commercial exploitation of artificial insemination by unscrupulous of misinformed individuals is possible.
6. It requires more time than natural service which tends to limit its use to large herds or well-organized cooperative organizations, or well-managed private enterprises.
7. The cost per service is higher than with the dairy stud bull service plan.

In Idaho, a state law requires that those who practice artificial insemination commercially be licensed by the state. A special short course covering artificial insemination technique is given at the University of Idaho and Agricultural Colleges in some other states for those interested in securing a license or learning the technique.

Barns and Equipment

TWO types of barns are recommended for Idaho conditions:

1. The one-story milking barn used in conjunction with a shelter shed.
2. The two-story barn with modified model stalls.

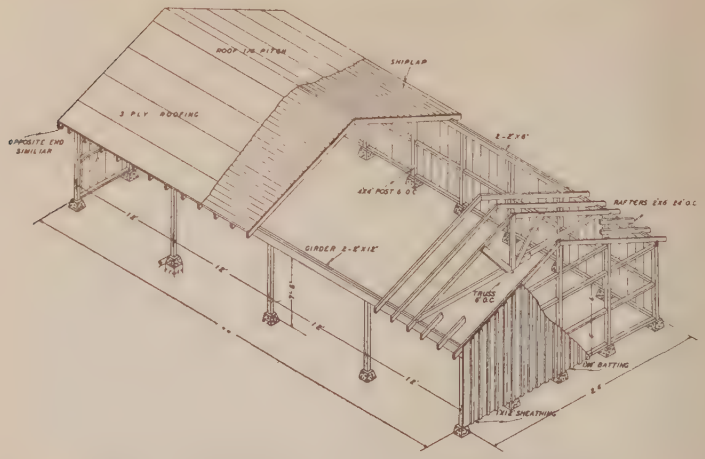
The one-story milking barn and shelter shed is recommended in those areas where ample straw for bedding is available. The advantages of this system are: low cost construction, good light, convenience, minimum labor, also comfort for the cows. The disadvantages are: more straw is required, and the milking barn is cold in the winter. During some periods of the year it is difficult to keep cows out of the mud, unless concrete paths are constructed from the shelter shed to the milking barn, also to and surrounding the outside hay rack and water tank. Electrically heated automatic drinking cups are now on the market which may be installed in the shed. The shelter shed needs to be bedded only two or three times a week. The manure is preserved well and the cows are clean. The heat generated in the deep straw and manure assists to keep the udder from getting cold and becoming congested. The manure is cleaned out of the shed two or three times a year and if a manure loader is used a minimum amount of hand labor is required. All cows should be dehorned where the shelter shed system is used.

The essential factors in building a shelter shed is to have it large enough, low enough and deep enough. Between 60 and 70 square feet per cow is necessary, depending on the size of the cows. The depth should never be less than 24 feet and up to 30 feet in colder climates. The height should not be more than 8 feet at the eves.

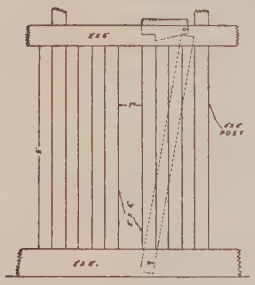
A combination of hay and straw storage barn with a shelter shed on one or both sides (depending on size of herd) is often used in those areas where the hay and straw must be under cover. In this combination hay storage and shelter shed, the hay is fed in mangers inside the shed, so arranged that the hay can be placed directly in the manger from the hay storage. This system is especially convenient where chopped hay is fed.

The milking barn may be built with one row of 4 to 8 adjacent stalls or two rows of 4 to 8 stalls facing out, depending on the size of the herd. It is advantageous in large herds to have the shelter shed divided into pens holding the same number of cows as the milking barn so that each group can be handled as a single unit with very little disturbance. The cows are in the barn only for milking and grain feeding then turned out into the shelter shed. Rigid wooden stanchions are cheap and quite satisfactory when the cows are in the barn only during milking time.

The grain storage and milk house should be located at the most convenient place to save time and labor, yet meet sanitary requirements.

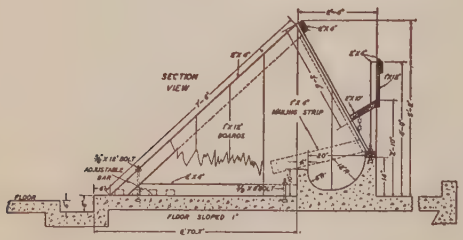


Plan for Shelter Shed—File Number 721-8A



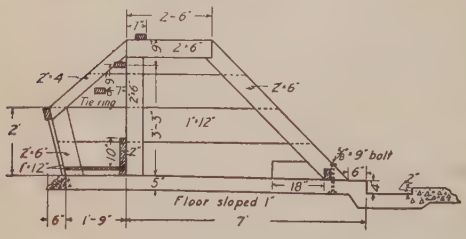
Plan for Rigid Stanchion File Number 7231-4

Low cost and easy to construct. Recommend for use when cows are in the barn only a short time.



Plan for Model Stall File Number 7231-1

Recommended when cows are kept in barn. Comfortable for the cow and requires small amount of bedding.



Plan for Modified Model Stall File Number 7231-2

Similar to Model Stall, except hay and grain fed in same manger, which allows more light.

THE model stall and modified model stall are cheap, home-made, comfortable for the cows, require less bedding, keep cows clean, and reduce labor in cleaning barn and cows. Recommended where cows are kept in the barn and open shed system not used. The modified model stall does not obstruct the light in the barn as badly as the model stall, and the manger is better suited to feeding chopped hay. However, the stall partitions are not as strong as in the model stall.

Dimensions for the model stall and modified model stall must be varied according to the beed of cattle handled as follows:

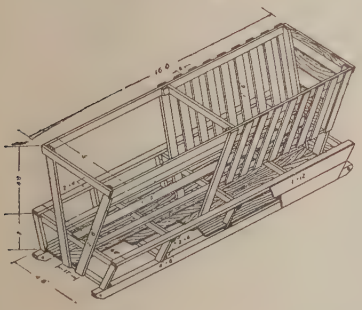
Holsteins—4 feet wide, 7 feet long, manged to gutter edge.

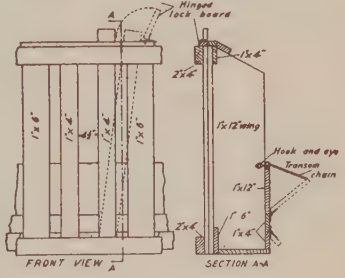
Guernseys or Ayrshires—3 feet 9 inches wide, 6 feet 6 inches long, manger to gutter edge.

Jerseys—3 feet 6 inches wide, 6 feet long, manger to gutter edge.

Plan for Calf Stanchion
File Number 7231-3

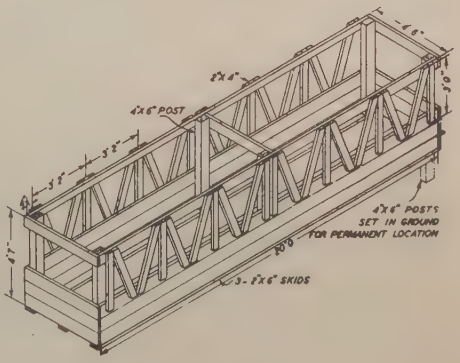
Calves should be fed individually in stanchions.





Plan for Hay Rack
File Number 772-2

Plan for Hay Rack
File Number 772-10



Plans for equipment shown on these pages may be secured from the Department of Agricultural Engineering, University of Idaho, Moscow. When ordering be sure to indicate the file number shown for each plan.

If it is desirable to keep cows in the barn at night, the model stall or modified model stall is comfortable, keeps the cows clean and requires less bedding than stanchions. This arrangement is also cheap to construct and reduces labor in cleaning the barn and the cows. This system of stabling cows is recommended where the shelter shed system is not used. A two-story barn with hay and straw stored in the second story is a satisfactory type of barn for this arrangement.

Chopped or Ground Hay

CHOPPED or ground hay is used very widely in some sections of Idaho. There is very little waste in feeding chopped or ground hay. It is convenient to feed (often in a selffeeder) and requires much less storage space than loose or baled hay. Chopping or grinding hay does not increase its nutrient value, but cows usually eat slightly more with less waste.

Covered Hay Racks

MANY dairymen using outside hay racks have them covered to keep the hay dry and more palatable and to prevent waste. Concrete platforms surrounding the outside hayrack with concrete strips from the hay rack to the shelter shed and from the shelter shed to the milking barn assists to keep the cows out of the mud.

Milk Room

A MILK room with proper cooling and sterilizing equipment is essential for the production of high quality milk. Plans for milk houses, combination of milk house and milking parlor, dairy barns, sheds, and equipment are available from the Department of Agricultural Engineering, University of Idaho, Moscow, Idaho, and are described in Extension Bulletin 118.

Labor Saving

Labor-saving equipment such as milk carts and feed carts save much time and labor. The location of the milk room, the grain storage bins, the silo, and hay are very important in saving time and labor. Every step that can be saved twice daily at milking time, saves many hours during a year's operation. The policy of developing a larger herd which will justify labor-saving equipment, also rearrangement of housing and feeding facilities, and securing equipment for the production of high quality dairy products is worth the serious consideration of every dairyman.

Thought should also be given to practices which make the work around the dairy barn easier, such as less stooping, less lifting, and less carrying.

Housefly and Hornfly Control

FLIES are carriers of many diseases affecting man and his livestock. When left uncontrolled they endanger health and are extremely annoying to both man and animal. Flies around the farm home and buildings and on livestock can be eliminated by following the recommendations given in Idaho Extension Circular No. 90. Briefly the steps are:

1. Destroy all breeding places through rigid sanitation.
2. Spray all fly resting places with a DDT water suspension. Spray inside and out.
   a. Apply first spray early in June.
   b. Apply second spray about August 1.
3. Control hornflies by spraying cattle every two weeks or when flies reappear. Use DDT water suspension. **DO NOT SPRAY ANIMALS WITH A DDT-OIL SPRAY.** DDT in oil is dangerous to both man and animals.

For all fly control work, use 4 pounds of 50 percent wettable DDT powder in 100 gallons of water and apply at not less than 400 pounds pressure with a power sprayer. If power equipment is not available, increase the concentration of DDT in the spray mixture by using ¼ pound of 50 percent wettable DDT powder in 1 gallon of water and apply with a hand-type sprayer.

Cattle Grubs and Lice

CATTLE grubs and lice not only irritate but also weaken cattle by their feeding and living habits. Heavy infestations cause a loss in vitality, which results in a decrease in the production of milk and meat. Grubs and lice can be controlled by following the recommendations outlined in Idaho Extension Bulletin No. 155.

Cattle should be treated for lice in the fall. For the best results use 4 pounds of 50 percent wettable DDT powder in 100 gallons of water and apply at not less than 400 pounds pressure, with a power sprayer. Each animal should be thoroughly covered with the spray. A 5 percent DDT dust thoroughly worked into the hair with the finger tips will also give effective control, although this method is not practical where large herds are involved.

The only time that grubs can be controlled is after they have cut breathing holes through the skin of the animal. This occurs during late winter and early spring. Excellent control can be obtained when two, or sometimes three, treatments are applied. Community spraying programs are desirable to obtain maximum results.

Rotenone is the only known insecticide that will control cattle grubs. Power spray equipment should be used to treat large herds. Small herds may be treated by hand washing or hand dusting. For spraying use 7½ pounds of finely ground cube or derris root (5

percent rotenone) in 100 gallons of water and apply at 400 pounds pressure. Commercial preparations can be used as recommended by the manufacturer except that it is not necessary to add sulfur. One hundred gallons will treat 200 or more animals, depending upon their size.

For hand washing, use 1 pound of cube or derris root (5 percent rotenone) in 5 quarts of water. The mixture can be applied from a quart jar with several ¼ inch holes punctured in the lid. Use a stiff fiber brush to force the materials into the grub holes.

The hand-dusting method is satisfactory for cattle with thin short hair. Use a dust mixture containing 1 pound of cube or derris root and 2 pounds of pyrophyllite or talc. Apply the dust mixture with a shakertop can and gently rub in a rotary motion with the fingertips as it is being applied.

Quality Is Essential for Profit

IF THE Idaho dairy industry is to compete successfully with other areas and to retain a market for milk and dairy products, it is absolutely necessary that only milk and other dairy products of the highest quality be produced and offered to the public. The basis for high quality dairy products is good milk—milk of fine flavor from healty cows, free from dirt, and containing only a small number of bacteria, none of which is harmful.

HEALTHY COWS

Have your veterinarian make regular examination and follow his recommendations in regard to: bovine tuberculosis, contagious abortion, and mastitis.

CLEAN COWS

Clean milk cannot be produced from dirty cows. Keep cows clean by the following practices:

Brush cows before milking.
Clip hair from udder, belly, and flanks.
Wipe udder with clean damp cloth before milking.
Provide plenty of bedding.
Clean barn regularly.
Drain and keep yards free of manure.

GOOD FEED

Feed and weed flavor are imparted to milk for as long as 4 to 7 hours after being eaten. Feed silage, wet beet pulp, turnips and other highly flavored feeds after milking, never just before or during milking. Keep cows off pastures containing weeds which impart their flavor to milk or remove cows from pasture containing highly flavored plants 3 to 4 hours before milking.

CLEAN BARN

It is easier to produce good milk in a well-lighted, well-ventilated, clean barn.

An elaborate, expensive barn is not necessary.

A tight ceiling prevents chaff and dust from falling into milk.

Tight, waterproof floors are easier to clean. These make it easier to keep cows clean and to prevent undesirable odors.

Remove manure to a place at least 50 feet from the barn. This place must not be accessible to the cows.

Do not keep horses in the same barn with cows unless separated by a tight partition.

CLEAN HEALTHY MILKERS

Milkers should be healthy and free from infectious diseases.

Milkers should wear clean clothing and have their hands clean and dry.

Good milk cannot be produced with wet-hand milking.

Use sanitary precautions with milking machines.

Milking machines do not eliminate the need for personal cleanliness.

WELL-MADE UTENSILS

Well-made, well-tinned utensils with smooth rounded surfaces are easier to keep clean.

It is impossible to clean rusty utensils, or those with open seams or rough solder.

CLEAN UTENSILS

Use small top milk pails when hand milking and stripping.

Thorough washing of all utensils is essential.

1. Rinse utensils in cold or lukewarm water.
2. Wash utensils in hot water containing an alkali washing powder (do not use soap). Use fibre brush to wash utensils **(Do not use cloth).**
3. Rinse utensils in scalding hot water.
4. Invert utensils on clean, dry racks so water will drain off.

STERILE UTENSILS

Use heat or chemical sterilization to destroy bacteria on utensils.

The U. S. Public Health Service Milk Ordinance requires that for satisfactory sterilization dairy utensils should be: (1) exposed for at least 15 minutes to at least 170° F. or for at least 5 minutes to at least 200° F. in a steam cabinet; or, (2) exposed to a jet of steam for at least 1 minute; or, (3) exposed to a chlorine solution of approved strength (100 parts per million of available chlorine) for at least 2 minutes; or, (4) immersed in hot water at 170° F. or more for at least 2 minutes. Regardless of the method used for sterilization, the utensils must be dry at the end of the sterilizing process. Rinsing utensils with a chlorine solution containing 100 parts per million of available chlorine and draining thoroughly will aid materially in reducing the number of bacteria.

A SUITABLE MILK HOUSE

Immediately after milk is drawn from the cow, remove it from the barn to a clean, well-ventilated milk house or milk room for straining, cooling, and storage.

PROPER STRAINING

Straining milk improves its appearance and removes foreign material but does not remove the bacteria.

Keep foreign material out by clean methods, not by straining it out.

Use type of strainer with single service cotton disk which is discarded after each milking.

Cloth strainers are difficult to clean and sterilize.

PROMPT, PROPER COOLING

Prompt cooling of milk to 50° F. or below retards the growth of bacteria and insures better quality milk and cream.

Water is 21 times as efficient a cooling medium as air at the same temperature.

Circulating water is a satisfactory device for cooling milk.

Stirring hastens the cooling of milk.

CLEAN, STERILE SEPARATOR

The separator should be washed and sterilized after each run. The following methods will insure a clean separator: (1) Flush the separator with clean, warm water before separating and immediately after, while the machine is still running. (2) Take the bowl apart and wash all parts, including the covers, with a fibre brush. Use water as hot as the hands can stand containing a dairy washing powder (do not use soap). (3) Rinse all parts thoroughly with boiling water and allow them to drain in a clean dry place protected from dust and flies. In separating milk, the following precautions should be observed: (1) Separate the milk as promptly as possible after milking. (2) Skim a cream testing approximately 35 percent, since it keeps better, costs less to deliver, and provides more skim milk for feeding. (3) Cool the cream to below 50° F., if possible. (4) Never run warm cream into cold cream. (5) Keep the cream covered and below 50° F., if possible, until it is delivered. (6) Deliver the cream frequently.

PROMPT, PROPER DELIVERY

Deliver milk to processor or distributing plant daily.

Protect milk and cream in transit by an enclosed type of truck or cover cans with canvas or blanket covers.

Idaho Publications on Dairying

FOLLOWING is a list of the dairy publications of the Agricultural Experiment Station and the Agricultural Extension Division of the College of Agriculture, University of Idaho, available for distribution. Any of these publications may be obtained free upon request. Write to the Agricultural Experiment Station, Moscow, or Agricultural Extension Division, State House, Boise.

Agricultural Experiment Station Bulletins

No. 150 *Apple Pomace Silage for Milk Production.*
No. 174 *Standardization of Milk with Skim Milk Powder for the Manufacture of Cheddar Cheese.*
No. 193 *Efficiency of Cream Stations in Cream Collection.*
No. 212 *Effect of Various Phases in the Manufacture of Casein by the Natural Sour Method on its Physical and Chemical Properties.*
No. 213 *Pea Meal as a Feed for Dairy Cows.*
No. 215 *Sunflower Silage for Milk Production.*
No. 216 *Potatoes as a Feed for Dairy Cows.*
No. 223 *Idaho Bull Associations.*

Agricultural Experiment Station Circulars

No. 50 *Why Cream Tests Vary.*
No. 61 *Operation and Care of the Cream Separator.*
No. 102 *Vitamin A Potency of Idaho Butter.*

Extension Division Bulletins

No. 83 *Dairy Products for Health and Economy.*
No. 118 *Farm Dairy Structures.*
No. 130 *Factory Tests for Dairy Products.*
No. 134 *Feeding Potatoes to Livestock.*
No. 136 *Livestock Judging.*

Extension Division Circulars

No. 51 *Prevention and Control of Bang's Disease.*
No. 58 *Suggestions for Feeding Dairy Calves.*
No. 61 *Why Milk Tests Vary.*
No. 66 *Essentials for Producing Good Milk and Cream.*
No. 68 *Home-Grown Grains and By-Products Feeds for Dairy Cattle.*
No. 70 *Prevention and Control of Calf Scours.*
No. 76 *Why Cream Tests Vary.*
No. 84 *Rapid Milking.*
No. 85 *Artificial Insemination of Dairy Cows.*

Research Bulletins

No. 12 *Distribution and Costs of Steam, Electrical Power and Labor in Representative Idaho Creameries.*
No. 224 *Influence of Growth temperature on the Thermal Resistance of Some Bacteria from Evaporated Milk.*

Research Papers

No. 76 *Inheritance of Hernia in a Family of Holstein Friesian Cattle.*
No. 83 *Vitamin A Content of Pasture Plants.*
No. 88 *Influence of Different Starters on the Quality of Cheddar Cheese.*
No. 93 *Technic in Chemical Analysis of Casein.*
No. 102 *Influence of Type of Rations and Plane of Production on Water Consumption of Dairy Cows.*
No. 106 *Influence of Homogenization on the Curd Tension of Milk.*
No. 108 *Influence of Mastitis on Curd Tension of Milk.*
No. 109 *Water Requirements for Dairy Calves.*
No. 110 *Effect of Bovine Digestion and Manure Storage on the Viability of Weed Seeds.*
No. 119 *A Feed-Grinding, Elevating, and Mixing Installation Utilizing a Banner-type Feed Mill and Blower Elevator.*
No. 132 *Inheritance of Wrytail in Jersey Cattle.*
No. 136 *Vitamin A Content of Pasture Plants, II.*
No. 137 *Vitamin A Content of Pasture Plants, III.*
No. 138 *Vitamin A Content of Pasture Plants, IV.*
No. 139 *Vitamin A Activity of Third Cutting Alfalfa Hay as Affected by Methods of Curing.*
No. 165 *A Skull-Defect in Cattle.*
——— *The Influence of Certain Bacteria on the Ripening of Cheddar Cheese Made from Pasteurized Milk.*
——— *A Preliminary Report of the Use of Lentin in Atonic Indigestion of Dairy Cattle.*

The above list may be supplemented by the United States Department of Agriculture Publications on dairying and related subjects.